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ABSTRACT

The guide and the project record book included in this document are designed for 4-H members who would like to start a salt-water aquarium project. The guide includes the following topics: (1) general requirements for salt-water aquariums; (2) directions for making an aquarium; (3) suggestions for where to locate it; (4) pros and cons of using artificial sea water versus natural sea water; (5) types of material to use in the bottom of the aquarium along with instructions for cleaning it; (6) a discussion of filters, subsand filters, pumps, power filters, decorations, lighting, and heating that could or should be used; (7) recommendations on how to fill the aquarium with water; (8) guidelines for purchasing animals for the aquarium; (9) drawings of seven hardy tropical fish; (10) suggestions for collecting marine animals from natural environments; (11) procedures for introducing newly purchased or collected animals to the aquarium; (12) tips on feeding and water maintenance; (13) solutions for two common problems associated with salt-water aquariums; and (14) a 15-item bibliography of books and pamphlets on maintaining aquariums. The project record book contains a checklist, an activity sheet, charts, and record sheets to be filled out during the project. (JW)

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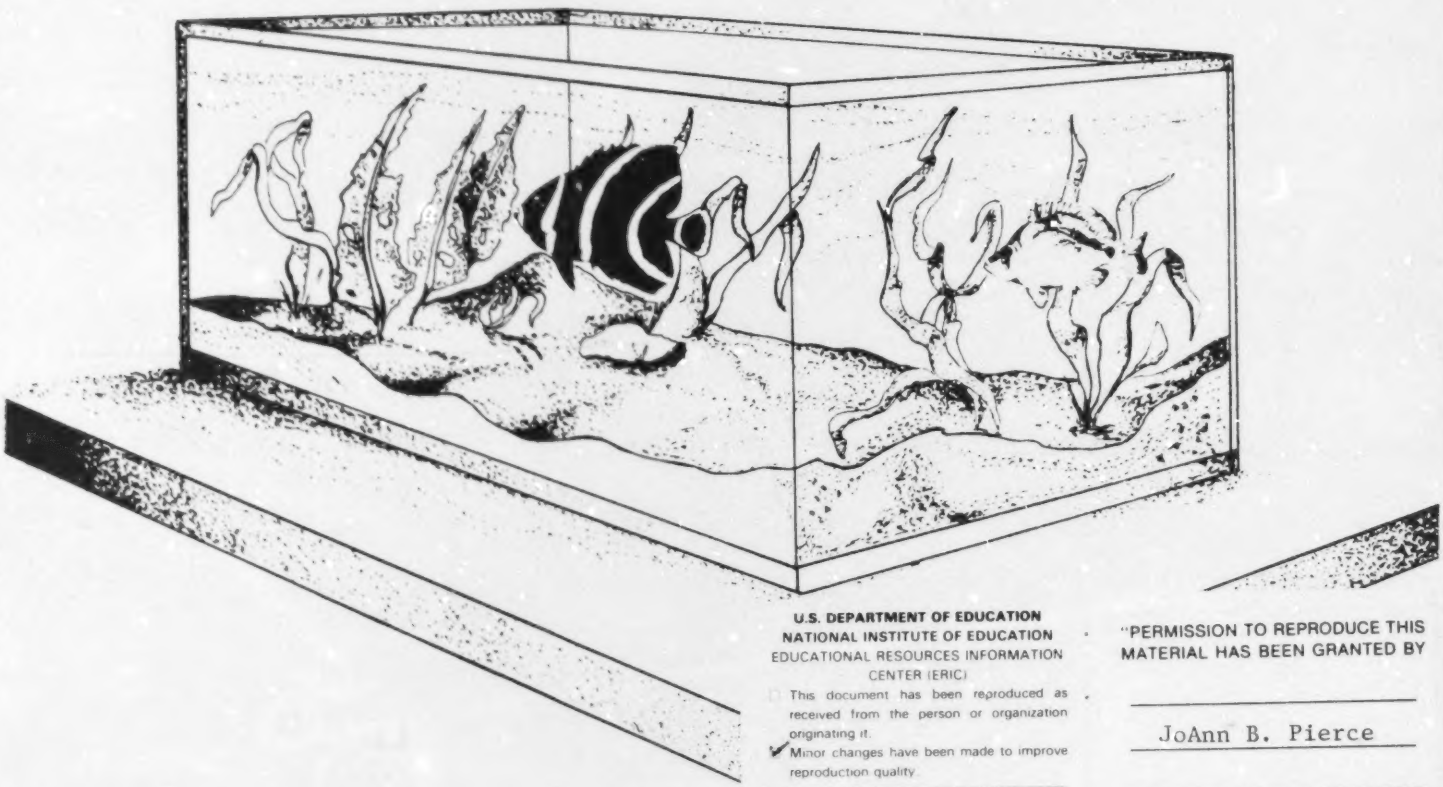
# Starting and Maintaining A Marine Aquarium

Florida Cooperative Extension Service / Institute of Food and Agricultural Sciences / University of Florida / J. T. Woeste, Dean



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## 4-H Members Guide

Florida 4-H Marine Program

# STARTING AND MAINTAINING A MARINE AQUARIUM

prepared by
Neil Crenshaw*

We gratefully acknowledge the assistance of Barbara Jayne Palko, Fisheries Biologist, National Marine Fisheries Service, B. J. Allen, Extension 4-H Youth Specialist, Dr. James C. Northrop, Extension 4-H Youth Specialist, and Tom Leahy, Editor, Florida Sea Grant Program, for reviewing this publication.

## The Project

This project is intended for those 4-H members who have an interest in aquariums and would like to start a project on salt water aquariums. To satisfactorily complete this project you must read the information carefully, do what is suggested, keep accurate data and successfully maintain your salt water aquarium for a period of at least six months.

The companion publication to this one, "Starting and Maintaining a Marine Aquarium - 4-H Member's Project Record", 4-H 357 contains a project maintenance list which should be kept. If you intend to enter this project in 4-H contests you should keep this record very carefully. If you make your own aquarium, take some pictures to show the various stages you went through in constructing it. Pictures of the aquarium with the animals in it will be a great help in your record book.

## Something About Aquariums

Bringing aquatic creatures into your house will take some planning and patience on your part. The marine aquarium is a perfect "home away from home" for some ocean dwellers. All living things, on land or in the water, have four basic needs: space, oxygen, light and food. Ocean animals have a special need: salt water.

An aquarium should not be too small. Would you like to play and live in a closet all your life? Probably not. Aquarium animals, also, need space in which to play and exercise.

Metal is very poisonous to sea creatures in an aquarium. For this reason you don't want to use an aquarium with any metal parts. Fresh water aquariums can have metal frames but salt water aquariums should be made of glass, all glass and nothing but glass.

How big should the aquarium be? If you are going to keep only one or two animals in your aquarium, it need not be too large. The more animals you have, though, the larger it should be. A good rule of thumb to go by is, two gallons of sea water for every inch of fish. If you have five fish and each one is about two inches long, there should be at least 20 gallons of sea water in the aquarium (5 fish x 2 inches = 10. 10 X 2 gallons = 20 gallons). Remember that we are talking about sea water and not the size of the aquarium. A 20 gallon aquarium with all of its equipment, gravel, and decorations will not hold 20 gallons of water. It is suggested that you use at least a 30 gallon aquarium when starting out. A few years ago it was cheaper to build your own aquarium than it was to buy one. Today, due to glass prices, it is more economical to buy an aquarium than it is to make one.

*Florida 4-H Marine Education Specialist

## Buying an Aquarium

Aquariums come in two styles: high and low. Select the lower, longer style because it provides more surface area exposed to air and more bottom area important to the growth of beneficial bacteria and green algae. The aquarium should be all glass sealed with clear silicon sealant. Check for a recessed ridge around the top. This provides space for a glass cover preventing splashing, evaporation and introduction of foreign objects (dirt, pencils, etc.). A 30 gallon aquarium will cost you about $32.00 depending on where you buy it. When you get your tank home fill it with water. If it leaks return it. Do not try to fix it!

## Making an Aquarium

Making an aquarium can be a little more expensive than buying one already made. Making your own aquarium, though, can be more rewarding. If you know of someplace where you can get glass fairly inexpensively, it might be best to make it. Many glass companies have glass taken from broken store windows (reclaimed glass) which they will sell at a low price. Check with a glass company to see if they have reclaimed glass.

The glass should be at least 3/8 of an inch thick, clear, with ground edges. 3/8 inch glass, at most glass companies, will cost about $5.00 per square foot. There are almost twelve square feet of glass in a 30 gallon aquarium. Therefore, a 30 gallon aquarium will cost you about $60.00 to build from glass at retail prices.

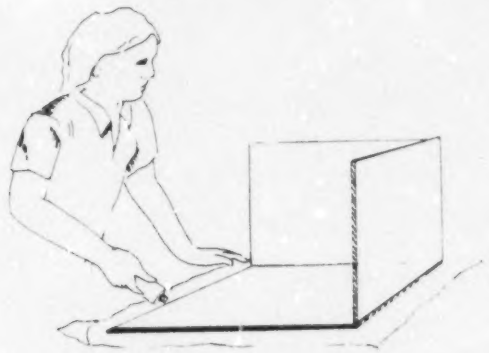
If you are interested in making your own aquarium you will need the following materials for a 30 gallon aquarium:

1. 3/8 inch thick glass of the following dimensions:
   (a) one piece (bottom) 36 X 12 inches
   (b) two pieces (front & back) 36 X 16 inches
   (c) two pieces (sides) 11 X16 inches
2. Two tubes of silicon sealer.
3. One package of single edged razor blades.
4. Small bottle of rubbing alcohol.
5. Several rags or paper towels.
6. Piece of paper (wrapping paper, large paper bag or newspaper will do) larger than the bottom of the aquarium.
7. Scotch tape.
8. A sturdy table with a smooth top, out of the way of traffic.
9. Cotton.
10. Sponge.

Clean the edges of all pieces of glass with cotton dabbed in alcohol. Allow the glass to dry sufficiently. Place a large rectangular piece of paper flat on the table. The paper will prevent the aquarium from being glued to the table top. Carefully place the bottom of the aquarium on the paper. Along only one of the long edges of the bottom run a strip of silicon glue. When applying the glue it is very important to do it smoothly and evenly. There is no need to use a

whole lot, but it is important to have glue along the **entire** edge. Watch for small dry spaces produced by air bubbles in the tube of silicon sealer. Take the front piece and carefully place its edge on the glued edge of the bottom. Press it down firmly, not forecefully.

Brace the front piece of glass with a bucket, heavy box or some other sturdy object while you continue your work. Don't have someone hold it for you because a person can not hold it steady enough. Run a strip of sealer along the top edge of both ends of the bottom piece of glass and also along the inside edges of the front piece. Place both sides, one at a time, on top of the glue at the ends and press firmly. Two pieces of tape at either end will hold the two sides to the front while you continue.



**Gluing the Glass**

Run a strip of glue along the top edge of the bottom and along the outer edges of the side pieces. Carefully place the back glass on top of the glue that's along the bottom and against the glue along the side pieces. Press firmly. Put two pieces of tape on each end. Check all edges and make sure that they fit squarely.

Let the aquarium sit undisturbed for at least one day. This will give it time to dry properly. After it dries fill the aquarium, up to one inch from the top, with tap water. If it doesn't leak after sitting overnight you have successfully sealed your aquarium.

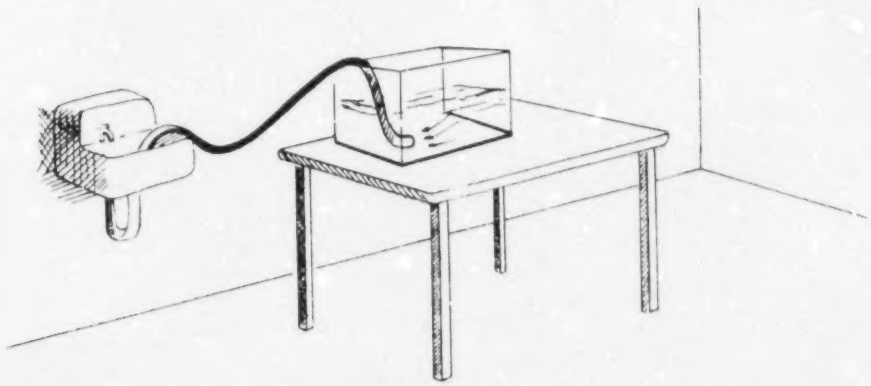
Drain the aquarium. Do not try and move it when it has water in it. If you do, you will run the risk of breaking it. **Move an aquarium only when it is empty!** To drain the water out, simply put a hose in the water. Fill the hose with water from a tap and let it drain out. Since water seeks its own level, water will continue to drain out as long as there is water in the hose and the end of the hose that is out of the water, is lower than the end which is in the water.

Drain all of the water you possibly can out of the aquarium. Sponge out excess water. Dry the aquarium with rags or paper towels. You can now trim away any excess silicon glue by using single edged razor blades. Be careful not to let the blade of the razor slip between two glued pieces of glass. Trimming off the excess glue will make the aquarium neater and more attractive. If you trim your aquarium, though, you must re-test it again by filling it with fresh water as before. Once you have your aquarium trimmed and you know that it doesn't leak, you are ready to fill it with salt water.

If your aquarium does leak, mark the leaking areas with a grease pencil. Drain the aquarium as described above. Dry the aquarium thoroughly, and re-glue those areas that you marked. Fill the aquarium with fresh water as before and check for leaks again. Once you have all of the leaks fixed you can drain it, dry it out, and get ready to fill it with salt water.

## Placing the Aquarium

Seawater is quite heavy. It weighs about 8.5 pounds per gallon. A 30 gallon aquarium with 25 gallons of sea water, crushed coral, decorations and other equipment will weigh about 240 pounds. That is why, once you fill it, the aquarium should be considered a permanent fixture. The setting in which you place your aquarium is also very important. The health of your animals depends a lot on how much light and heat the aquarium receives. The tank should be placed on a level structure away from direct drafts and sunlight. Drafts produce rapid drops or rises in temperature. This will cause stress and a lowering of resistance to disease among your animals. Exposure to direct sunlight can often cause an undesirable growth of algae and a possible unwanted temperature rise. Fish are cold blooded. Their body temperature changes with that of their environment. Extreme changes often lead to stress, diseases and death.



**Draining an aquarium**

The aquarium should be placed in a well-traveled area. This will allow your fish to become accustomed to outside movements and will make them easier to observe.

## Artificial Sea Water or Natural Sea Water

Sea water for the aquarium may be either synthetic or natural. Local marine life can survive quite well in water from the collection area. Although this water may be dark colored or contain suspended matter, most of this can be removed by proper filtration. If exotic marine life is to inhabit the aquarium, then synthetic salts should be considered since these mixtures more closely resemble sea water, with all of the necessary ingredients. Do not attempt to use table salt. Table salt will not adequately sustain the lives of your animals because it does not have all of the necessary minerals.

### Artificial Sea Water

Artificial sea water is made by adding prepackaged ocean salts to tap water. Before the prepackaged salts are added to tap water, though, the chlorine should be taken out of the tap water. In order to get rid of chlorine in tap water allow the water to stand in plastic buckets for at least two days. To mix the salts and water simply follow the instructions on the package. Once the artificial sea water is in your aquarium wait at least two weeks before adding fish or other animals. This two week period will allow the sea water to stabilize and become more suitable for the animals. Remember, the proper preparation and care of the aquarium means life or death to the fish.

### Natural Sea Water

If you live near the ocean you can collect the water to fill your aquarium. Unless you collect the sea water far out at sea you will be getting contaminants with the water. Sea water near shore is usually polluted with various chemicals and metals that react with the salts in the sea water. These chemicals and metals come from streets, yards, farm lands and industrial complexes, and are washed into the rivers by rain and carried to the ocean. When collected near shore, sea water will have contaminants to some degree. Fish that live in the water of the surrounding area will usually survive and do quite well in that collected water. You will begin having problems, though, when you start introducing exotic species that do not live in the water which you collected. It is suggested that you use artificial sea water if you ever intend to keep exotic tropical fish in your aquarium.

If you are going to collect natural sea water do so while the tide is flooding (coming in). Collecting during this time will lessen the chance of getting contaminants in the water. Collect the water in containers made of glass, plastic, or some other non-corrosive material. When you get the sea water home, filter it through a funnel containing dacron floss.

Store the filtered water in a container with the cover on. Allow the water to stay undisturbed, for at least two weeks. The water should **not** receive any light or air during the two week storage period. This storage period will kill most of the microorganisms and algae in the sea water. You want the sea water as pure as possible before putting it in your aquarium.

During this period of storage you can be preparing the bottom materials which will go into the aquarium.

## Bottom Material

A good material to use in the bottom of a marine aquarium would be coquina shells (*Donax*, "Perwinkles"), calcified algae, dolomite or crushed coral. Do not use colored rocks or sand in a marine aquarium because they may contain preservatives that could be toxic to your marine animals.

**Coquina**

Small shells and other pieces of limestone material help to keep the pH of the sea water toward the alkaline side (non acidic). If you collect your own material from the beach remember, don't use any container, sifter, shovel, etc. that is made out of metal. Use only non-corrosive containers and equipment.

**Filtering seawater through dacron floss**

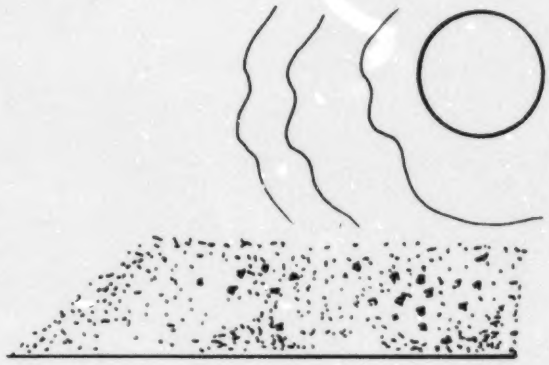
Collect or buy enough bottom material so that it will make a layer that is at least two inches thick in the bottom of the aquarium. The number of gallons of bottom material that you will need is easy to calculate. Simply divide the number 2 (number of inches thick) into the height of your aquarium (inches). Take the answer and divide it into the size (gallons) of the aquarium. For example, if you have a 30 gallon aquarium which is 16 inches high, divide 2 into 16. 16 divided by 2 = 8. Then divide the answer (8 in this case) into the gallons (30). 30 divided by 8 = 3.75. You will need at least 3.75 gallons of bottom material. To be on the safe side, collect or buy more than you need because some will be lost in the cleaning process.

**While flushing the bottom material, stir it with a stick and allow the dirt to flow over the side of the bucket with the water.**

**Cleaning**

It is best to clean the bottom material outside, in the yard, so you don't make a mess in the house. Pour part of the collected material into a plastic bucket so that it fills the bucket no more than 1/3 full. Clean the material by flushing the bucket of material with fresh water from a garden hose. As the water fills the bucket, stir it with a stick. Don't stir it with your hands because there may be sharp objects (sea urchin spines, pieces of broken glass, etc.) that could poke or cut your skin. As your stir the flushed bottom material, dirt and organic debris will float to the top and flow over the edge of the bucket with the water. This is part of the cleaning process. When the water is clear, drain the water out of the bucket and scatter the bottom material out over a flat surface such as a table top, patio or the ground covered with a plastic sheet. Wash the remaining bottom material in this manner. Allow the bottom material to remain out in the sun for at least one week. Bottom material should be scattered where nothing will disturb it. While the bottom material is drying, you can begin to set up the aquarium.

**Scatter the bottom material over a flat surface.**



**Let the sun and fresh air dry out the bottom material.**

## Setting up the Aquarium

**Filters**

There are two different kinds of filters with which you will need to supply your aquarium. One kind of filter is the subsand or under-gravel filter. The other type is the outside power filter.

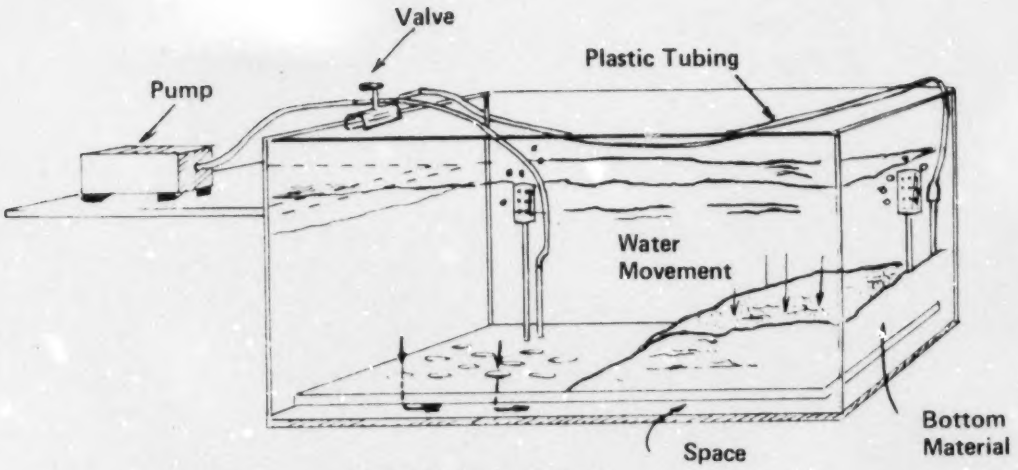
**Subsand Filter**

The subsand filter slowly moves the water in the aquarium through the bottom material (shells, coquina, etc.) and back into the aquarium. This is a very important filter to have because it removes organic waste matter. Bacteria which lives in the bottom material will take waste matter that has been produced by the animals, and convert it into harmless matter.

If you have the type of subsand filter that uses an air pump, as shown on page 6, the air pump should be placed higher than the water level in the tank. If the pump is below water level, salt water may travel down the plastic tubing to the pump. If the electricity goes off, water will back up into the pump. Aquariums have also been known to siphon themselves onto the floor after the plastic tubing had worked loose from the vibrating pump. Oh what a mess that is!

**Keep the pump above water level!**

Some subsand filters work by using a water pump with impellar blades rather than an air pump, to move the water. With this type of pump there is no danger of the aquarium siphoning itself.




SUBSAND FILTER

**Air being pumped down to the filter and back up creates a suction. The suction pulls the water down through the bottom material and back again into the aquarium. Bacteria living in the bottom material clean the water as it passes through. This acts as a very good biological filter.**

**Power Filter**

The outside power filter removes suspended matter, toxic gases and water discoloration. It also provides very good circulation of water which is beneficial in marine aquariums. This type of filter is placed on the outside of the tank and is driven by a motor.

The water in the aquarium is siphoned, via siphon tubes, into the filter box and moves down through a layer of carbon and filter floss. The carbon absorbs waste matter such as ammonia, urea and carbon dioxide. Make sure you use carbon and not charcoal. Carbon lasts much longer and is a better filtering material. The bottom layer of filter floss will pick up particles missed by the upper layer of carbon.

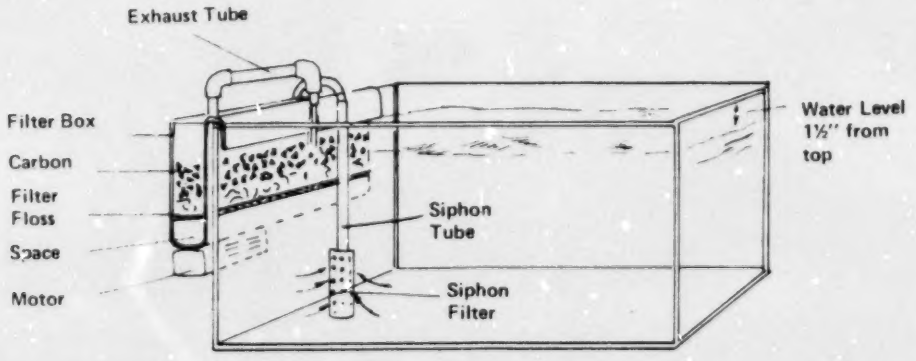
In order for the siphon tube to work it is necessary to keep the water level in the aquarium at least 1½ inches from the top.

After the water moves through the carbon and filter floss it is then pumped into the aquarium via the exhaust tube. Keep the exhaust tube above the level of the water so that it will help aerate the water.

Frequent cleaning of the power filter is not recommended unless the filter is so clogged that circulation is slowed down. Cleaning will interrupt the important denitrifying action that takes place in the carbon and floss. This type of filter should rarely require cleaning more than once a month. (Hallett)

Remember to keep the filters on the ends of the siphon tubes clean. Also make sure that these filters are secure and won't fall off. Small animals can become trapped in the siphon tubes or sucked into the power filter if the siphon filters are not on.

Read the directions to the power filter **carefully**. Proper construction and maintenance (oiling, changing floss, carbon, etc.) is very important to its functioning properly.




Outside Power Filter

**Decorations**

If you use rocks to decorate the inside of your aquarium, choose rocks that are **not** porous. Porous rocks have small holes that will collect organic matter and allow small animals to hide. The small animals that hide in the spaces will eventually die and pollute the aquarium. Make sure that the rocks you use either have no small holes or that the holes are large enough so that small animals cannot hide and can be removed easily if they die.

Coral is probably the most frequently used decoration for marine aquariums. It is very natural and its chemical quality is conducive to good sea water conditions. Cured sea fans and sea shells may also be used. When using sea shells make sure that they have a hole punched in the end so that water will circulate through them. Also, when using sea shells, watch for pieces of food that may become trapped inside, producing polluted water.

Do no use metal objects as decor since metal is usually toxic. Wood and sponges, while they look good, will eventually rot and break up in sea water. You can buy artificial plants at most aquarium shops today. These plastic plants have their place in an aquarium if placed tastefully.

When using coral and rocks, soak them in a solution of bleach for 2 days and then in fresh water for at least one week. After soaking in fresh water, smell the material. It should be free of any trace of bleach before adding to the aquarium. Soak sea shells in a bleach solution for only an hour to keep from ruining the nice outside luster of the shell.

It is illegal to collect any type of coral in Florida. If you would like to use coral as a decor, check with an aquarium shop or one of the many shell shops throughout southern Florida.

**Lighting**

It is necessary to cover the aquarium if you use a light. Fluorescent bulbs are the best for marine aquariums. Fluorescent light shows the animal's colors to the maximum and helps to promote green algae growth which is highly desirable. A combination of a Gro-lux or Sea-lux fluorescent bulb with a cool-white fluorescent bulb seems to work best.

The lights should be left on for at least twelve hours each day. This helps to promote luxuriant green algae growth which is necessary for a well balanced aquarium. Although some people leave the lights on all the time it seems as though algae can utilize the light waves only during the daylight hours. Also, turning the lights off at night will be appreciated by those animals which like to sleep during the night. (Hallett)

**Heating**

Most marine animals can live quite well in a temperature range of 70-75°F (21-24°C). If you have exotic tropicals, it would be best to check with your local aquarium dealer about temperature requirements for that particular species. The temperature of the water in a marine aquarium should also be kept constant as much as possible. In order to keep the temperature even throughout the aquarium, place the heating element under the water being expelled from the power filter. This will help distribute the heat evenly throughout the aquarium.

## Filling the Aquarium

After you have your aquarium with its heater and filters in place, bottom material in place and decor properly arranged you are ready to fill it with sea water. Fill it slowly! Either fill the aquarium by siphoning or by using a plastic bucket.

If you siphon the water, place the large buckets containing the sea water above the level of the aquarium. Keep the end of the hose that is in the bucket about four inches from the bottom. By doing this you will not siphon up any debris that has accumulated in the bottom of the bucket. Siphon all the water from the bucket into the aquarium except for the last four inches.

If you use a bucket to fill the aquarium it should be made of plastic and small enough to handle easily. A one gallon bucket is about the right size. Slowly submerge the plastic bucket in to the large container of sea water, making sure not to disturb the bottom sediment. Pour the water into the aquarium by letting it run slowly down the inside of the glass. Continue to fill the aquarium in this manner until you have all the water, except for the bottom four inches out of the container.

Fill the aquarium to approximately 1½ inches from the top. This will enable the power filter's siphon tubes to work properly. Place a piece of tape or mark at the water level. This will serve as the evaporation indicator.

Turn on the air pump that supplies the subsand filter. Check the air tubing for leaks. If you are using an air forced subsand filter, small air bubbles should be coming from the filter's plastic tubes. Start the siphon to the power filter and allow it to fill the filter box with water. Once the filter box is filled, turn on the filter's motor. Water should flow from the filter's exhaust tube into the aquarium. If the water level in the filter box goes down, an additional siphon tube is needed. Turn the lights on and leave them on until you are ready to introduce the animals. After about one week you should begin to see algae growth on the inside of the glass and on the decor. Clean the algae off the front glass by using a nylon cleaning pad and teflon sponge. These will remove the algae and not scratch the glass. Once algae starts to form, you can begin introducing the animals.

## Buying Animals

If you are going to buy your animals you will save a lot of headaches, time and money if you observe the following:

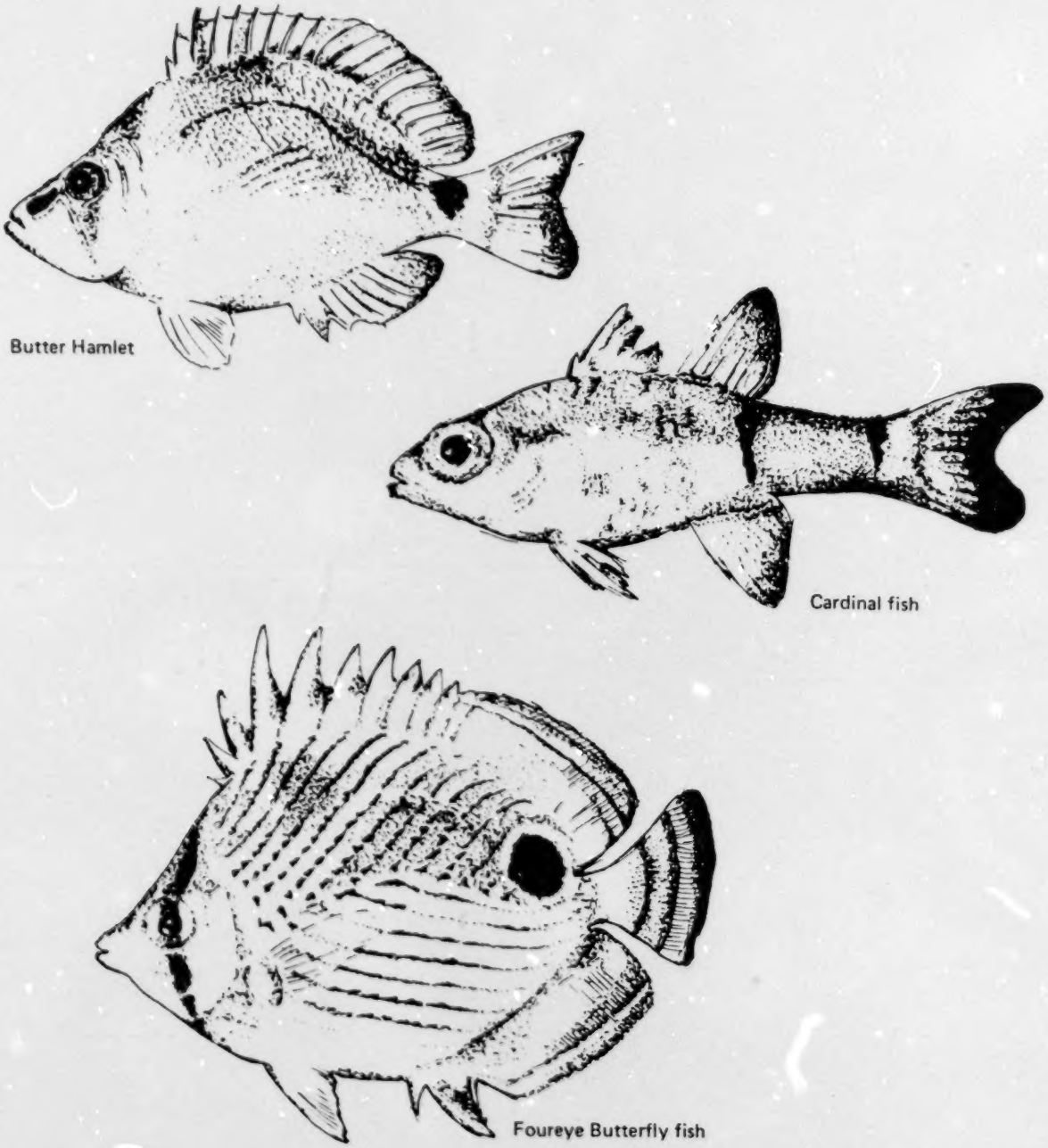
1. Inspect the aquarium in the store. Do they have adequate aeration and filtration?
2. Are the animals eating normally?
3. Is each fish's color bright and clear?
4. Avoid fish with white spots, torn fins or other blemishes.
5. Fish should not be "breathing" rapidly.
6. Fish should be swimming around leisurely, not erratically.
7. Look closely at the area just above the backbone; if compressed or pinched, the fish is starving. Not much can save it. Don't buy it!
8. Find out how long the animals have been in the store. If they are healthy and have been in the aquarium for more than one week, it's a good purchase. Be wary of

newly introduced animals.

9. After you have made your purchase, the animal should be placed in a plastic bag of sea water, aerated with oxygen and the bag sealed.

**Some Hardy Marine Tropicals**

Drawing made from *Caribbean Reef Fishes*, by John E. Randall.

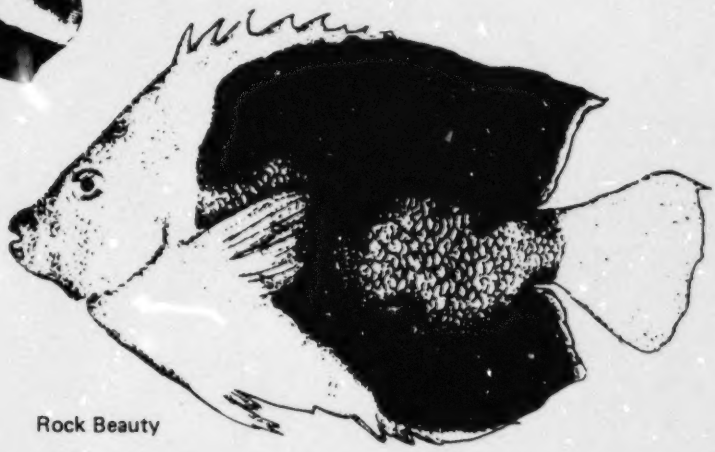


Butter Hamlet

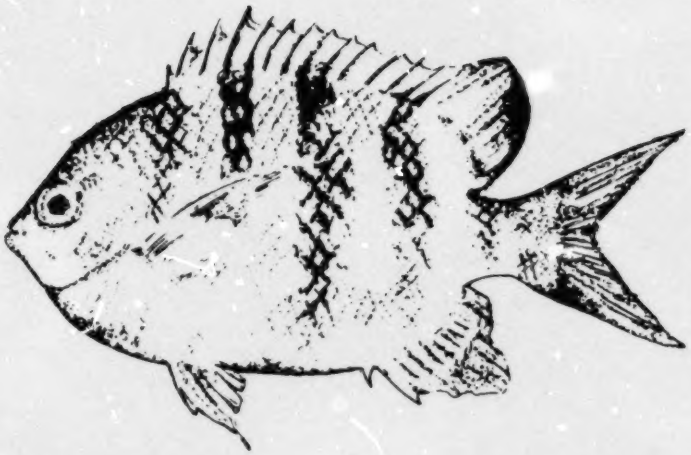
Cardinal fish

Foureye Butterfly fish

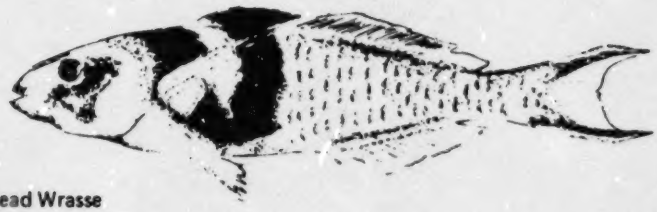
Juvenile French Angelfish*



Rock Beauty



Sergeant Major



Bluehead Wrasse

## Collecting Animals

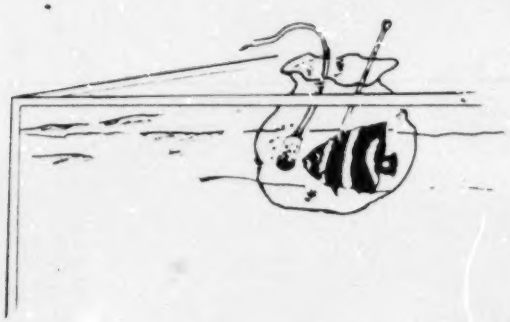
Some of the best methods used in collecting marine animals is through the use of seines, cast nets and hand nets. These methods usually do not harm the animals. Diving for marine creatures has become another popular method in collecting. Skin divers and scuba divers either use a hand-held net or slurp gun. The hand-held net has proven to be more effective than the slurp gun. A slurp gun often damages or even kills the animal being sucked up into the tube of the gun. When using the hand-held net, the animal is simply coaxed into the net and is not harmed.

After you have collected your animals, they should be placed into plastic bags containing seawater from that area. Don't put more than one animal in a plastic bag. Many animals, when confined, will be aggressive and kill one another. Small plastic bags, which hold about one quart, are excellent for transporting small marine animals. Tie the top of the bag securely with a rubber band and transport them home immediately.

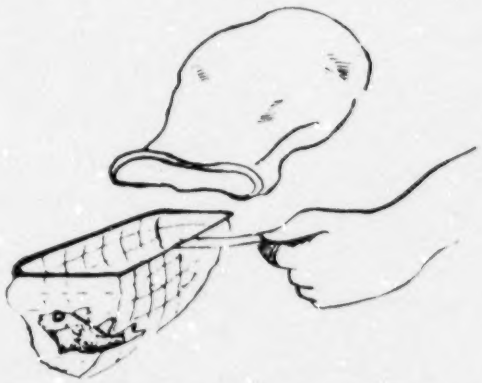
## Introducing the Animals

One you get the animals home, be patient. Time and the method used in introducing the animals to their new home are the most important factors in successful aquarium keeping. Follow the suggested procedures below and you should have 100 percent success:

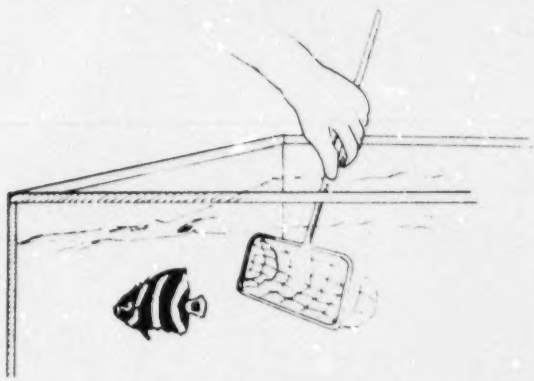
1. Turn off the aquarium lights and dim the room lights.
2. Take the water temperature of the water, both in the aquarium and in the bags.
3. Float the bag (containing the animal) in the aquarium and place an air stone connected by tubing to an air pump in the bag.



4. Pour about one half cup of the aquarium water into the plastic bag. Do this every fifteen minutes until the temperature of the aquarium water and the water in the bag are equal.
5. Once the two temperatures are equal allow the animal to remain in the plastic bag for another half hour. **Don't get impatient!**
6. Do **not** tip the bag and let the animal swim out into the aquarium. This will cause the animal's waste products (ammonia, urea, nitrates, etc.) which have accumulated in the bag to go into the tank.



7. Pour the water from the bag, with the animal, through an aquarium dip-net over a sink. Immediately but carefully place the dip-net with the animal into the aquarium and allow the animal to swim freely out of the net.



8. Keep the lights dimmed for the rest of the day. Do not feed for 24 hours. After 24 hours feed only lightly.

## Feeding

How often and what you feed your aquarium animals is extremely important. Fish should be fed twice a day but in small amounts. Food that is not eaten should be taken out before it begins to decay. The more you can vary the diet, the healthier your animals will be. You would even become tired of sirloin steak every day!

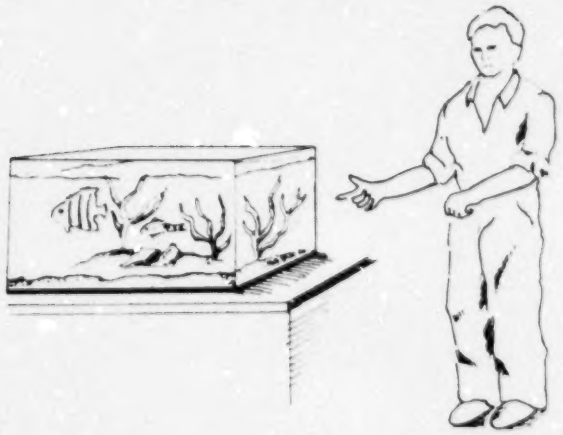
After a while you should begin to learn what kind and how much food your marine animals will eat. Some aquarium animals will prefer certain foods and require different

amounts than some of the other animals. The animals that move around a lot will probably require feeding as much as twice a day while those that prefer to remain quiet will be able to go for several days between meals.

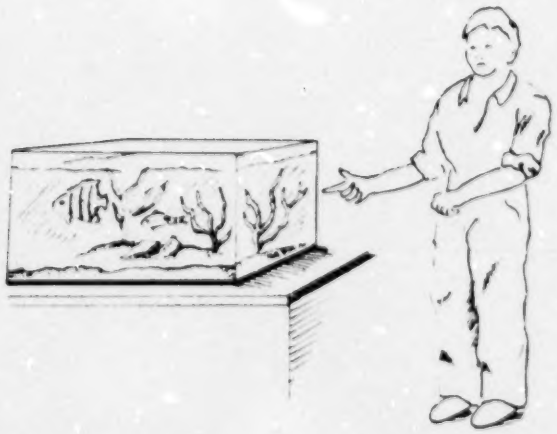
Some excellent foods, which are available freeze-dried are: brine shrimp, mosquito larvae, tubifex worms and ocean plankton. **Live** brine shrimp are excellent to feed to most active fish as well as to molluscs (scallops, clams, etc.) and living corals. Include algae in the feeding program at least three times a week. Algae helps to maintain the bright colors of the angelfish, tangs, and parrot fishes.

Dried flake food should not be used to start your acquarium. Flake food should only be fed to the animals once they have gotten used to their new environment. Use flake food sparingly. Once or twice a week is enough. Learn what kinds of foods your animals eat in the wild and feed them those kinds. Remember, don't over-feed your animals!

## Water Maintenance



**The aquarium water should have a clean smell and be crystal clear.**



**If the water is not clear and you can smell an odor, the water is bad.**

Once the aquarium is set up with water, equipment and animals it is necessary to maintain it in good condition. Animals produce toxic wastes and the wastes will continue to increase as time goes by. An aquarium is a closed system. There is no natural changing of sea water. Even with filtration, toxic levels can build up unless the necessary measures are taken.

One of the most important things is to replace about one fourth of the water in the aquarium with fresh seawater. How do you know when the water needs to be changed? Look at its color. Is it the same color as it was the first day? Smell the water. Does it have an odor? It should not have an unpleasant odor. If the water is not clean and has a smell, it should be changed. Simply siphon one fourth of the water out of the aquarium and discard it. Slowly add new seawater. Always keep an extra supply of seawater handy in plastic buckets.

Even with a top on the aquarium, water will evaporate from the aquarium. It is important to remember that salts will not evaporate with the water. Replace any water that has been lost due to evaporation with either distilled water or aged tap water. Do not take water directly from a faucet to fill the aquarium. Fresh tap water contains chlorine and this might kill the animals. Tap water should be aged in a plastic bucket for at least a week in order to get rid of the chlorine.

To keep track of evaporated water place a piece of tape or a mark at the beginning water level. As water evaporates the level will go down. Replace the water slowly so that the newly added water will not shock the animals. Before adding the water check its temperature. The water to be added should have the same temperature as that in the aquarium.

## Potential Problems.

The problems listed below are two of the most common problems associated with keeping a salt water aquarium:

1. White spots on the fins and body of fishes. The white spots are tiny parasites known as "oodinium". The infected fish will usually "breathe" rapidly and scratch themselves on rocks and other objects. The infected fish should be placed in a separate "hospital" or treatment tank containing one teaspoon of 1 percent copper sulfate solution to one gallon of seawater. Leave the fish in this tank for about one week. Do not attempt to treat the fish in your main aquarium. Make sure that the treatment tank has good water, plenty of aeration and filtration.
2. Very small, white, bug-like critters that appear on the glass of the aquarium. These copepods are about as long as the wire of a paper clip is wide. They are not harmful to marine fish but usually appear just before the water in the aquarium becomes polluted. If you feed your marine animals too much, some of the food particles that are not eaten will begin to decompose. These decomposing food particles will begin to foul the aquarium. When this happens, the little white copepods appear. When you see these copepods, you should change the water immediately. Change at least ½ the water volume with either artificial sea water or natural sea water that has been properly filtered.

There are other problems which may occur. For descriptions of other fish diseases and their treatment, it is suggested that you select one or more of the books and phamphlets on the reference list.

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*So You Want to Keep a Marine Aquarium?*, Jeff Hallet, Marine Science Education Center, Mayport, FL 32067.


Illustrations by David B. Laidlaw

Florida 4H Marine Program


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# Starting and Maintaining a Marine Aquarium
## 4-H Member's Project Record Book

Florida Cooperative Extension Service Institute of Food and Agricultural Sciences University of Florida, Gainesville J. T. Woeste, Dean

### Project Maintenance List

In order to properly take care of your aquarium and the animals that live in it you will need to maintain a daily, weekly, and monthly check list.

### Daily

For the daily check list you will need a calendar. Keep the calendar near the aquarium. This will help remind you to make daily checks and also provide a place for checking each day with a pencil.

You will need to check the following things every day:

1. See that the **pump is running smoothly.**
2. If you are using an air powered undergravel filter there should be a flow of **tiny, even bubbles.**
3. **Remove any dead fish** or other animals. If you have shells as decor in the aquarium, make sure that no animal has hidden and died inside the shell.
4. **Remove excess food.**
5. **Check the water temperature.** Most marine animals can live quite well in a temperature range of 70-75°F (21-24°C). The temperature should remain fairly constant. Record the daily temperature on your calendar.
6. **Clean the salt off** that has been deposited on lights, sides and top of the aquarium. This is very important. If this is not done daily, the salt and minerals will form a hard crust that will be almost impossible to remove later on.

## Marine Aquarium Project Record

In order to complete your project on the marine aquarium you should do the following activities. This record of activities and your story will be judged if you decide to enter it as a marine science project.

Name _____

Address _____

_____

A. Books and pamphlets read:

1. _____
2. _____
3. _____
4. _____
5. _____

B. People who helped with this project:

1. _____
2. _____
3. _____
4. _____
5. _____

C. Some problems encountered while setting up and maintaining the aquarium:

1. _____
2. _____
3. _____
4. _____
5. _____

D. Why did you decide to take this project?

## Weekly & Monthly

For your weekly and monthly records, use the chart on the following page.
An example of how to maintain the Weekly & Monthly Chart is shown below:

| | Month | February | | | | March | | | | April | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Week | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 |
| Weekly Record | Check water level | ✓ | ✓ | ✓ | ✓ | ✓ | | | | | | |
| | Check salinity with hydrometer | ✓ | ✓ | ✓ | ✓ | ✓ | | | | | | |
| | Clean algae off inside of front glass | ✓ | ✓ | ✓ | ✓ | ✓ | | | | | | |
| | Gently stir the bottom material | ✓ | ✓ | ✓ | ✓ | ✓ | | | | | | |
| | Take pH (if possible) | ✓ | ✓ | ✓ | ✓ | ✓ | | | | | | |
| | Change the animals' diet | ✓ | ✓ | ✓ | ✓ | ✓ | | | | | | |
| Monthly Record | Replace ¼ sea water | | ✓ | | | | | | | | | |
| | Change carbon & floss to the power filter | | ✓ | | | | | | | | | |
| | Oil power filter's motor | | ✓ | | | | | | | | | |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Month | | | | | | | | | | | | |
| | Week | | | | | | | | | | | | |
| Weekly Record | Check water level | | | | | | | | | | | | |
| | Check salinity with hydrometer | | | | | | | | | | | | |
| | Clean algae off inside of front glass | | | | | | | | | | | | |
| | Gently stir the bottom material | | | | | | | | | | | | |
| | Take pH (if possible) | | | | | | | | | | | | |
| | Change the animals' diet | | | | | | | | | | | | |
| Monthly Record | Replace ¼ sea water | | | | | | | | | | | | |
| | Change carbon & floss to the power filter | | | | | | | | | | | | |
| | Oil power filter's motor | | | | | | | | | | | | |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Weekly Record | Check water level | | | | | | | | | | | | |
| | Check salinity with hydrometer | | | | | | | | | | | | |
| | Clean algae off inside of front glass | | | | | | | | | | | | |
| | Gently stir the bottom material | | | | | | | | | | | | |
| | Take pH (if possible) | | | | | | | | | | | | |
| | Change the animals' diet | | | | | | | | | | | | |
| Monthly Record | Replace ¼ sea water | | | | | | | | | | | | |
| | Change carbon & floss to the power filter | | | | | | | | | | | | |
| | Oil power filter's motor | | | | | | | | | | | | |

| | | | | | | | | | | | | | | | | Month |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | Week |
| | | | | | | | | | | | | | | | | Check water level |
| | | | | | | | | | | | | | | | | Check salinity with hydrometer |
| | | | | | | | | | | | | | | | | Clean algae off inside of front glass |
| | | | | | | | | | | | | | | | | Gently stir the bottom material |
| | | | | | | | | | | | | | | | | Take pH (if possible) |
| | | | | | | | | | | | | | | | | Change the animals' diet |
| | | | | | | | | | | | | | | | | Replace ¼ sea water |
| | | | | | | | | | | | | | | | | Change carbon & floss to the power filter |
| | | | | | | | | | | | | | | | | Oil power filter's motor |

Weekly Record

Monthly Record

| | | | | | | | | | | | | | | | | Check water level |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | Check salinity with hydrometer |
| | | | | | | | | | | | | | | | | Clean algae off inside of front glass |
| | | | | | | | | | | | | | | | | Gently stir the bottom material |
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| | | | | | | | | | | | | | | | | Replace ¼ sea water |
| | | | | | | | | | | | | | | | | Change carbon & floss to the power filter |
| | | | | | | | | | | | | | | | | Oil power filter's motor |

Weekly Record

Monthly Record

## Expenses

Keep a record of everything you spend on your project. List the date, what you buy and the cost. Expenses include equipment, travel, nets, fish purchased, medication, etc.

| Date Purchased | Quantity | Item | Cost |
|---|---|---|---|
| | | | |
| | | | |
| | | | |

Attach pictures of the aquarium on this page.

On this page tell what you did in the project and some things you learned.

This public document was printed at a cost of $316.50, or 10.5 cents per copy, to help 4-H youth learn about aquatic life by maintaining an aquarium. 2 - 3M - 80

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